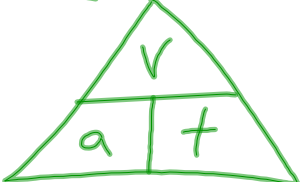


acceleration

vector — direction for motion
 + — east west north south

→ defined as a change in velocity
over a period of time

$$a = \frac{\text{Velocity}}{\text{time}}$$


Units - m/s/s - m/s²
 - km/h/s
 - feet/s/s

- Terms - constant acceleration,
 non constant acceleration.
 - Velocity/Time graphs.

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Sample.

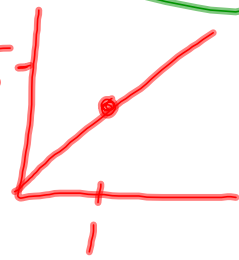
1. $a = ?$
 $v = 30 \text{ m/s}$
 $t = 2 \text{ s}$

$$a = \frac{v}{t}$$

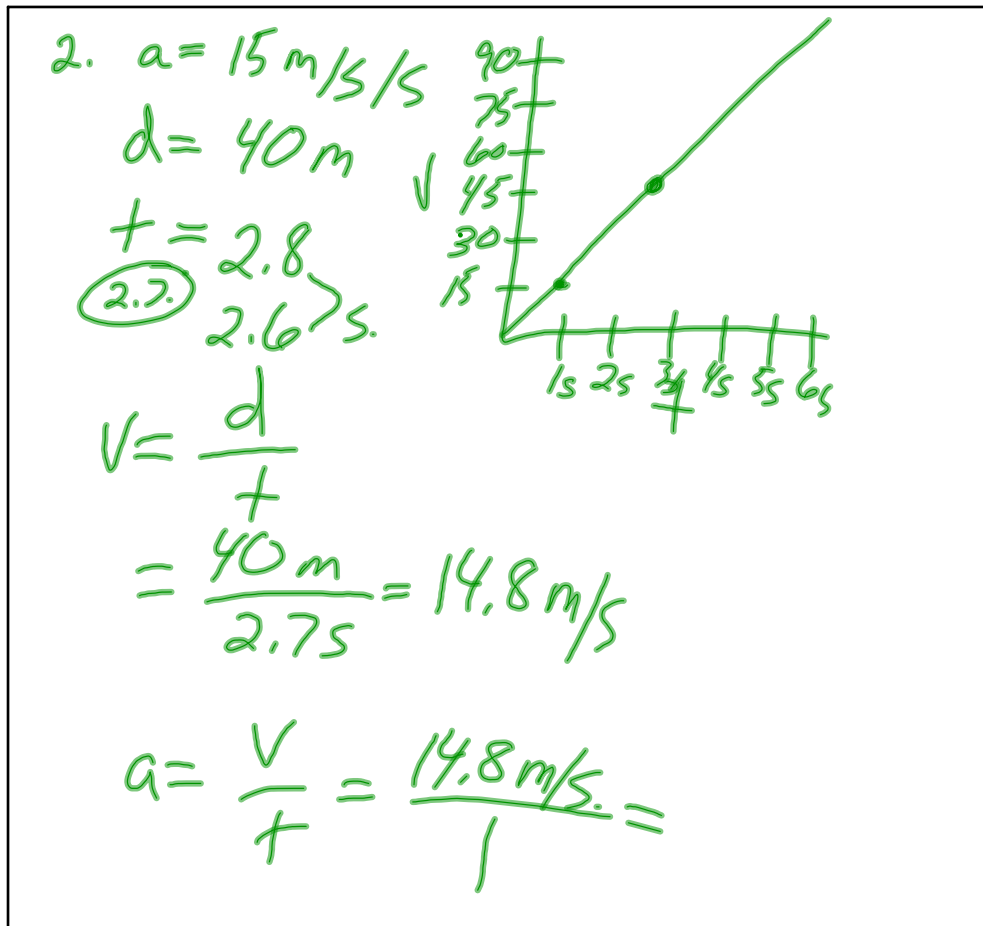
$$= \frac{30 \text{ m/s}}{2 \text{ s}}$$

$$= 15 \text{ m/s/s}$$

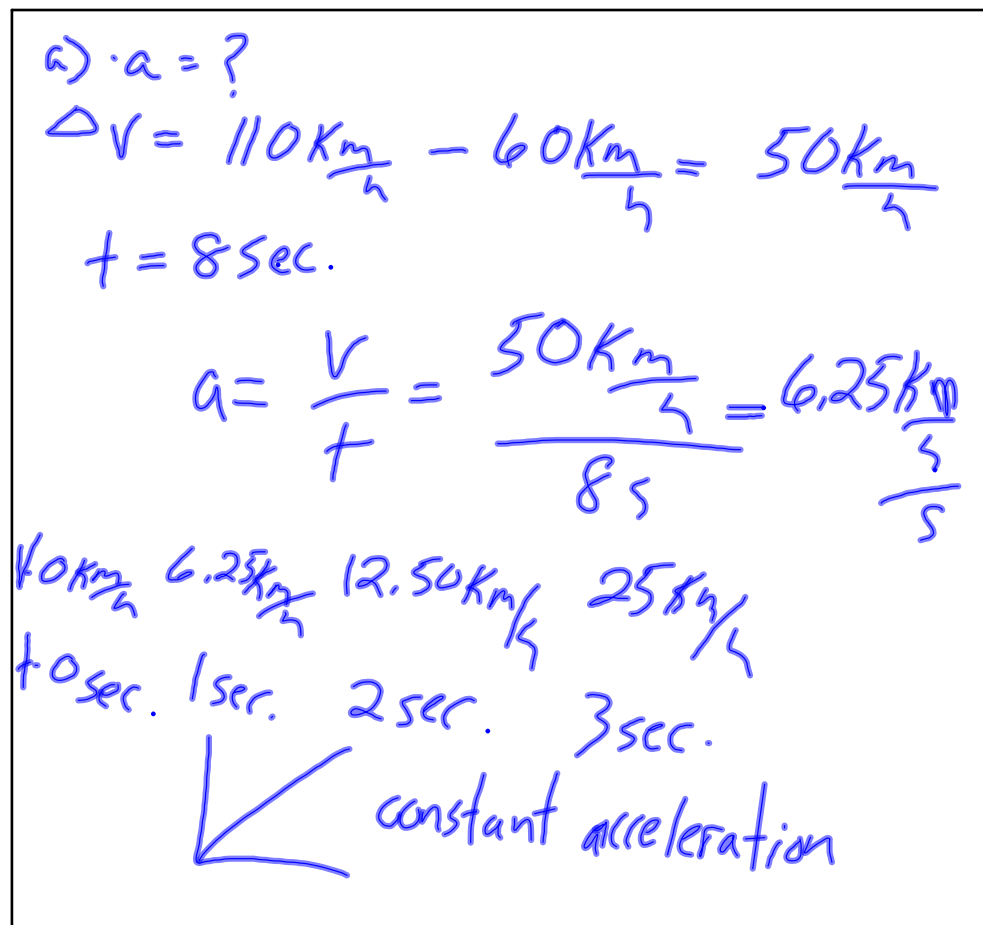
v 0 15m/s 30m/s 45m/s 15
 t 0 1s 2s 3s



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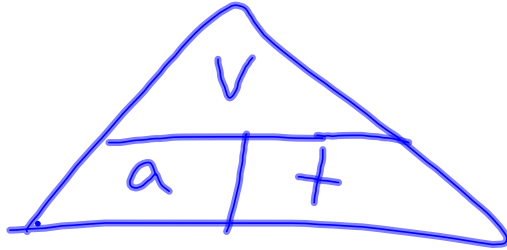
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b) $t = ?$

$$V = 160 \frac{\text{km}}{\text{h}}$$



$$a = 6.25 \frac{\text{km}}{\text{h/s}}$$

$$t = \frac{V}{a} = \frac{160 \frac{\text{km}}{\text{h}}}{6.25 \frac{\text{km}}{\text{h/s}}} = \underline{\underline{25.6 \text{ sec.}}}$$

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$$a = 20 \frac{\text{km}}{\text{h/s}}$$

$$t = 15 \text{ sec.}$$

$$d = ?$$

$$V =$$

$$V = a \times t$$

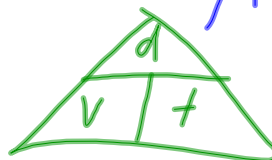
$$= 20 \frac{\text{km}}{\text{h/s}} \times 15 \text{ sec.}$$

$$V = 300 \frac{\text{km}}{\text{h}}$$

$$V = 300 \frac{\text{km}}{\text{h}}$$

$$t = 15 \text{ sec}$$

$$d = ?$$




$$d = V \times t$$

$$d = 300 \frac{\text{km}}{\text{h}} \times 15 \text{ sec.}$$

$$d = 4500 \text{ km}$$

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Velocity and Acceleration Calculation Worksheet



DIRECTIONS: Solve the following situation problems using equations for velocity and acceleration.

- What is the speed of a rocket that travels 9000 meters in 12.12 seconds?

$$v = \frac{d}{t} = \frac{9000\text{m}}{12.12\text{s}} = 742.67\text{ m/s}$$
- What is the speed of a jet plane that travels 528 meters in 4 seconds?

$$v = \frac{d}{t} = \frac{528\text{m}}{4\text{s}} = 132\text{ m/s}$$
- After an impact involving a non-functioning satellite, a paint chip leaves the surface of the satellite at a speed of 96 m/s. After 17 seconds, how far has the chip landed?

$$d = v \cdot t = 96\text{ m/s} \times 17\text{s} = 1632\text{ m}$$
- The space shuttle Endeavor is launched to an altitude of 500,000 meters above the surface of the earth. The shuttle travels at an average rate of 700 m/s. How long will it take for Endeavor to reach its orbit?

$$t = \frac{d}{v} = \frac{500,000\text{m}}{700\text{m/s}} = 714.29\text{ sec.}$$
- How long will your trip take (in hours) if you travel 350 km at an average speed of 80 km/hr?

$$t = \frac{d}{v} = \frac{350\text{ km}}{80\text{ km/hr}} = 4.375\text{ hours}$$
- How many seconds will it take for a satellite to travel 450 km at a rate of 120 m/s?

$$t = \frac{d}{v} = \frac{450,000\text{m}}{120\text{ m/s}} = 3750\text{ sec} = 62.5\text{ min.}$$
- What is the speed of a walking person in m/s if he or she travels 1000 m in 20 minutes?

$$v = \frac{d}{t} = \frac{1000\text{m}}{1200\text{s}} = 0.83\text{ m/s}$$
- How far (in meters) will you travel in 3 minutes running at a rate of 6 m/s?

$$d = v \cdot t = 6\text{ m/s} \times 180\text{ sec} = 1080\text{ m}$$
- In 0.5 seconds, a projectile goes from 0 to 300 m/s. What is the acceleration of the projectile?

$$a = \frac{v}{t} = \frac{300\text{ m/s}}{0.5\text{ s}} = 600\text{ m/s}^2$$
- A meteoroid changes velocity from 2400 m/s to 1600 m/s in 0.03 seconds. What is the acceleration of the meteoroid?

$$a = \frac{v}{t} = \frac{1800\text{ m/s}}{0.03\text{ s}} = 60,000\text{ m/s}^2$$
- The space shuttle releases a telescope into orbit around the earth. The telescope goes from being stationary to traveling at a speed of 1700 m/s in 25 seconds. What is the acceleration of the telescope?

$$a = \frac{v}{t} = \frac{1700\text{ m/s}}{25\text{ s}} = 68\text{ m/s}^2$$

$\frac{1700\text{ m/s}}{25\text{ s}} = 68\text{ m/s}^2$
 $\frac{17\text{ km/s}}{25\text{ s}} = 0.68\text{ km/s}^2$